Transition metal and rare-earth oxide inverse opals.

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Recently, photonic crystal (PC) developments have also focused to find new applications in other research areas where photons influence physicochemical processes. Specifically, photonic crystals can be of application in areas where the control of the optical properties can improve processes in photochemistry. By combining structure, chemical reactivity and photonic properties one would expect high performances in different research fields like photoelectrochemical solar cells [1], photocatalysis, as well as sensors development. Therefore, it would be very promising to synthesize photocatalytic materials (as TiO_2, $Zr0_2$, etc.) with an appropriate PC topology. Our approach is the fabrication of inverse opals made of oxides of transition metal and rare earth, (i.e.: ZrO_2, Y_2O_3 and CeO_2 [2]) because they could provide interesting structural and functional properties for such applications.
Here we report on the fabrication method of inverse opals made of nanoparticles with especial interest in a carefully control of the optical properties. It is also very important to control the nanoparticle size and structure of catalytic materials that gives the best performances in photochemical processes.

[1] S. Nishimura *et a*l. J. Am. Chem. Soc., **125**, 6306, (2003)
[2] A. Corma et al. Nature Mater. **3**, 394, (2004).